1: J Aerosol Med. 1994;7(1):49-75. Related Articles, Link

# Drug delivery via the respiratory tract.

**Byron PR, Patton JS.**

Aerosol Research Group, School of Pharmacy, Virginia Commonwealth University, Medical College of Virginia, Richmond 23298.

Inhalation offers an enormous absorptive surface area for rapid drug absorption and substantial absorption of polypeptides. Due to slow clearance from the lower lung, even compounds with very small absorption rates can be absorbed in significant quantities over 10-12h periods. Aerosol dosimetry problems can also be minimized when lung-normal patients are considered. In the near future, optimal formulations will be combined with modified aerosol delivery devices to achieve reproducible dosing. These will be used as alternatives to parenteral delivery for drug doses of the order of milligram: or less. Research on the molecular structural dependence of lung disposition is in its infancy. Absorption kinetics for small molecules are known to depend on lipophilicity and molecular size. For macromolecules however, electronic charge and site of deposition may be additional determinants of bioavailability. Carrier-mediated absorption processes may also be important The pulmonary absorption of a number of molecules is reviewed with specia emphasis on new and promising products of biotechnology like human insulin and human growth hormone. Delivery improvements in the future should ensure, ideally, that nondenatured, monomeric pure compounds are delivered reproducibly and predominantly to the lung itself, so that these compounds may elicit reproducible systemic effects following absorption.

PMID: 10147058 [PubMed - indexed for MEDLINE]

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1: J Aerosol Med. 1995 Fall;8(3):243-54. Related Articles, Link

# Delivery and retention of an insulin aerosol produced by a new jet nebulizer.

**Jendle J, Karlberg BE, Persliden J, Franzen L, Arborelius M Jr.**

Department of Internal Medicine, Faculty of Health Sciences, Linkoping University, Sweden.

This study describes the delivery and distribution of an aerosol generated by a jet nebulizer (MAXIN) in an experimental animal model. Anesthetised, intubated and ventilated piglets inhaled radiolabeled technetium diethylene-triamine-penta-acetic acid (99mTc-DTPA) through the endotracheal tube. The lungs were excised en bloc and scintigraphed, using a computerized gamma camera to evaluate the pattern of distribution. By nebulizing radiolabeled 125I-insulin and comparing the activity deposited on inspiratory and expiratory electrostatic filters, delivery and retention of nebulized insulin was assessed. The distribution of aerosol in the lungs was very even and reached the most peripheral parts. The delivery of nebulized insulin was calculated to be 88.9 +/- 5.3% and 36.1 +/- 8.8% of the insulin delivered to the respiratory tract was retained. The immediate local effects of insulin aerosol administration on the lungs were evaluated using light microscopy. No adverse effects were observed at histopathologic examination of the lung tissue. Conclusion: This study shows a high penetration of aerosol to the peripheral parts of the lung and efficient delivery of nebulized insulin when using the MAXIN-nebulizer.

PMID: 10155650 [PubMed - indexed for MEDLINE]

1: Lung. 1990;168 Suppl:677-84. Related Articles, Link

# Aerosols for systemic treatment.

**Kohler D.**

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The development of a new group of drugs (polypeptides) have recently increased the interest of alternative administration to the enteral route because of its proteolytic activity and the catabolism of the "first-pass effect." Aside from the "needle," the administration in the respiratory tract via aerosol is the method with the best efficiency. But several problems prohibited its spreading: (1) the accuracy and the reproducibility of the inhaled dose (range ca. 1:4); (2) the small amount of inhaled drug in relation to the dose in the aerosol delivery system (range ca. 1%-10%); (3) the fear of allergic reactions of the respiratory system; (4) the variability of the drug transport into the systemic circulation. New approaches and data raise hopes in reducing the problems: (1) aerosol delivery systems with defined particle spectrum and storage systems; slow vital capacity inhaling maneuver; (2) delivery systems that nebulizes nearly the total amount of drug; (3) all studie with the inhalation application of insulin, heparin, ergotamin, ribavirin, aminoglycosides, and "cigarette smoke" do not reveal any relevant allergic reaction; (4) many studies were performed in the last 10 years on the influence of substances and especially of diseases on the transport of molecules through the respiratory tract. Only a few of them are relevant (exogen allergic alveolitis, active sarcoidosis, active smoking). Aerosols for (exogen allergic alveolitis, active sarcoidosis, active smoking). Aerosols for systemic drug treatment seems to be a gained alternative to the "syringe."

Publication Types:
- Review
- Review, Tutorial

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